

Small Wonder Dragonflies and Damselflies

Beautiful and Beneficial



A voracious insect hunter with little fear of people, the 12-spotted Skimmer makes for good company when visiting riparian areas.

Photo, Dave Small

Summer days lie ahead. Many of us will find ourselves outside enjoying nature at a pond, on a river, or near some other water feature. More often than not we won't find ourselves alone. Insects of all kinds will pay us a visit to see what we are all about. Some are pests, but others will merely capture our attention as they go about their daily business. Two such creatures are dragonflies and damselflies. They tend to be bold, sometimes friendly, wishing to hitch a ride on the bow of your canoe or the top of your shoulder. This can make the squeamish jump, but these daring creatures almost always escape unscathed. The adventurer who can resist the urge to react will have the opportunity to observe an amazing array of colors and patterns these creatures display. And while each of them may have certain "fashion" appeal, all of them live a very unique life and are voracious predators for many of the aforementioned pests.

SMALL WONDERS - SEE PAGE 4

Unusual Projects Along the Way to Water Quality

The preeminent goal of the DCR office of Water Supply Management is to provide the highest quality drinking water. Science and society agree that the best way to achieve this end is through careful land management. These efforts include conservation and preservation of the natural environment. One might wonder what exactly constitutes this practice. The following stories give an inside peek at some of the unique and unusual things done to ensure the highest quality water from the DCR reservoir system.

UNUSUAL PROJECTS - SEE PAGE 2



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In This Issue:

Springtime is here again and that place for the snow shovel is now occupied by gardening tools. Old outdoor projects resume and new ones are undertaken. In its own way, nature makes this transition as well. Little creatures that were just a memory a few short weeks ago are back. Activity recently frozen solid not long ago, has come alive again. In this issue we look at some of nature's unique contributors, as well as some of DCR's efforts to protect the environment.

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www.mass.gov/dcr/waterSupply.htm

Wildlife Needs Good Habitat, Not Handouts



Photo, DCR/DWSP

While deer may look gentle from afar, they are always poised to protect themselves from danger. If this deer were to perceive a threat in this situation, this homeowner could find himself in serious trouble.

Winter and early spring can be a difficult time for wild animals, and our instinct is to try and offer a helping hand. However, consider the following information before you start feeding the neighborhood wildlife.

Feeding wildlife can spread disease.

Animals congregating at an artificial food source can lead to overcrowding, and this close contact can encourage the spread of diseases. Diseases could include rabies, Lyme disease, bovine tuberculosis, chronic wasting disease (currently not in Massachusetts), distemper, and roundworms. These diseases are harmful to wildlife and some may be dangerous to humans or pets.

Supplemental feeding is not beneficial to wildlife.

Wild animals are well adapted to surviving harsh conditions, and their digestive systems are best suited for processing natural foods. Foods provided by people

are often nutritionally deficient or unsuited for wildlife. For example, white-tailed deer gradually adapt a high fiber diet of woody browse, leaves, etc., during the winter. Providing high carbohydrate food (bread, corn, and grain) can overwhelm the digestive system because it doesn't have the right bacteria in place to process the food.

Feeding wildlife can lead to harmful behavior.

Animals that are fed by people often lose their fear of humans. Although the animals may appear timid, nearly all wildlife has the potential to injure humans or pets and conditioned animals may become aggressive. Behavior between animals may also change. Crowding often leads to physical aggression among animals, and larger individuals will exclude weaker ones, causing either physical harm or preventing feeding.

Be cautious when feeding wild birds.

Although birdseed is nutritious and wild birds do not lose their fear of humans, dirty bird feeders can cause the spread of disease. Conjunctivitis outbreaks in house finches are associated with dirty feeders. Feeders should be cleaned with a mild bleach solution, and the ground under the feeder should be free of moldy seeds and bird droppings.

Dan Clark - DCR/DWSP Wildlife Biologist

While a hand-out may sound like a good idea, wildlife favor feeding naturally on their preferred foods in a safe, healthy habitat.



Photo, DCR/DWSP

UNIQUE PROJECTS -FROM PAGE 1

Wachusett Reservoir Side-Scan Sonar Project

Elevated levels of mercury were discovered in 1986 in the tissue of fish taken from the Wachusett and Quabbin Reservoirs. A subsequent report assessed potential sources of mercury; one possible source was abandoned, submerged structures. A follow-up investigation was made to test this hypothesis. The study compiled maps to create a mosaic of the bottom of the Wachusett Reservoir, identifying locations of historic manufacturing buildings. These locations were used to direct sampling to the areas most likely to retrieve contaminated material.

To improve sampling accuracy, sidescan sonar was used to take images of the bottom of the reservoir. The sonar is angled so that the sound waves produce an image similar to aerial photography. The images confirmed that practically every structure within the reservoir area had been demolished or moved before inundation. For example, cellar holes were evident where homes once stood. The biggest discovery, however, was two steel trestle bridges, bent but intact. The Sawyer Mill and Scar Hill Road bridges in Boylston were the only structural



Photos, DCR/DWSP



These images show the old Scar Hill Road bridge. Side-scan

sonar data taken in November, 2000 through 70' of water is shown at top. The black and white photo shows the bridge over the Nashua River in Boylston from 1890s.

UNIQUE PROJECTS -FROM PAGE 2

remnants found below water; there is no recorded information regarding why these bridges were left standing.

The investigation ultimately found no submerged sources of mercury. It was determined, and has since been corroborated by other studies in New England, that the source was atmospheric deposition. The most likely source is from coal, which contains small amounts of mercury. When the coal is burned for power in the Midwest, the wind carries the mercury through the atmosphere until rain carries it down to the watershed's streams and ponds, where it bioaccumulates. Bioaccumulation is the process where minute amounts of substances are ingested by small organisms, which are then eaten by larger organisms, that eventually impact larger fish and other animals higher on the food chain.

To learn more, see 'Picturing Our Past,' a compact disc of images and data compiled during this investigation by Douglas Levin, Ph.D. It is available at the Boylston and West Boylston Public Libraries.

Vincent Vignaly - DCR Project Engineer



Photo, DCR/DWSP

Seagulls spotted by the Cosgrove intake.

The Bird Harrasment Program

The Wachusett and Quabbin Reservoirs are the unfiltered surface water supply system that serve the metropolitan Boston area. These large, open bodies of water have become a home for a large quantity of both transient and resident waterfowl (primarily gulls, ducks and geese). These birds typically spend the day feeding wherever a food source is readily available, such as landfills, dumpsters and parking lots, and then come to the reservoir to roost at night where they are safe from predators.

Building Demolition

In its efforts to protect watershed lands, DWSP occasionally acquires properties with buildings or other structures that require demolition. To ensure that these properties do not become environmental risks, DCR has each site inspected by a licensed industrial hygienist to check for the presence of materials such as asbestos, lead, and underground storage tanks. If hazardous materials are found, DCR hires licensed contractors to remediate the site prior to demolition work.

A building is safe for demolition after all hazardous materials have been removed and underground storage tanks are extracted (ensuring that the soil is free of contaminants) and the subsequent hole is back-filled. After building structures are dismantled and loaded into waste containers, the foundation is either removed from the site with other building materials or is crushed to pieces of six-inches or less and then compacted and buried under grade. The demolition contractor completes grading the site to a smooth, natural contour; DWSP then makes sure that erosion control measures are adequate and restores the site to a natural state.

The amount of birds roosting on the reservoir depends on what time of year it is, ranging from several hundred to several thousand, although rarely over 5,000. During warm weather the birds spread out over the many bodies of water throughout the region. As the cold weather progresses, the reservoirs -which are some of the last bodies of water in the region to freeze- become the only place for the birds to roost.

Bacteria and viruses from bird feces is a threat to contaminate the water supply. In response, DWSP has implemented a Bird Harassment Program. The program's success is a key component of the watershed protection strategy that helps these source waters meet drinking water quality regulations.



A DCR site before (above) and after (right) restoration.



Photos, Robert Lowell

Structures slated for demolition are often in isolated areas and thus can be an attractive shelter for trespassers. The peace of a once charming camp acquired by DWSP in the Ware River watershed continues to be enjoyed by squatters that have truly transformed the structure – porcupines! The porcupines have consumed most of the interior of the house and surrounding trees, converting the wood products to a biodegradable end product which they are storing in the house. Their digestive efforts have been so productive that residuals from the converted structure and surrounding trees nearly fill the basement and the first level of the house (now affectionately called "The Porcupine House"). Fortunately, the industrial hygienist found minimal hazardous materials on the property, so for the time being DWSP is encouraging the porcupines to complete their work converting the structure to pelletized compost.

Robert Lowell - DCR Civil Engineer

The Bird Harassment Program uses pyrotechnics from both shore and boat to prevent birds from congregating near the intake. This action directs the birds to the opposite end of the reservoir. Fecal contamination is not considered a water quality threat from these locations because the reservoirs' size provides the time and space to kill-off harmful constituents before it reaches the intake.

The most active time of day for the Bird Harassment Program is from late afternoon until dark, when birds arrive at the reservoir for the night. The typical season for these harassment activities begins in September until freeze over (usually January), resuming for the months of March and April.

Larry Pistrang - DCR Aquatic Biologist

SMALL WONDERS - FROM PAGE 1

Dragonflies and damselflies are on our side. The next time one stops to visit, take a moment to appreciate this insect friend.

Dragonflies and damselflies come in many sizes and color patterns, from the somewhat drab Frosted Whiteface to the more colorful Darners and Jewelwings. Most people recognize these insects, but few people are aware of the many different types found here in Massachusetts, how to correctly identify them, and where they prefer to live. These very common insects belong to the order Odonata. Odonates depend on wetland ecosystems for reproduction and survival while in the larval (juvenile) form. Depending on what type of dragonfly or damselfly it is, adults lay their eggs either on the surface of the water, inside a slit cut into vegetation, in mud, or on the surface of vegetation. The eggs hatch, beginning the longest stage of the insect's life. Some dragonflies remain in the larval stage for only a few months, such as those found in vernal pools, whereas others are larvae for up to 5 years! Damselflies may spend as many as 3 years in the larval stage.

How to tell the difference between a damselfly and a dragonfly.

Dragonflies are stocky and large in appearance. They tend to hold their wings out to their sides when resting and they are excellent powerful fliers. Damselflies are small and slender when compared to the dragonflies. When at rest, they hold their wings over their body or slightly open to the sides. All four damselfly wings are the same size and shape. The pair of forward wings differ in shape and size from the hind wings in the dragonflies. Finally, damselflies tend to be weaker fliers. They may be observed flitting about whereas the dragonflies tend to fly in a more determined, swooping fashion.

How to find Odonate larvae and what they look like.

Dragonflies and damselflies can be found in virtually any healthy wetland from vernal pools to flowing rivers. All you need to look at one close-up is a net, a bucket, and the willingness to get a little wet. With a net, scoop up a small amount of the detritus (otherwise known as goo, slime or muck) at the bottom of the pond,

stream or wherever you want to sample. Invert the net and gently dump the contents into a bucket or pan. A shallow, lightly colored pan that floats, such as a plastic dishpan, works really well. Let everything settle out for a minute or so and then look closely for any movement. Usually the nymphs are found crawling slowly along the bottom of the pan.

Dragonfly larvae or nymphs are usually brownish in color with a somewhat flattened abdomen. They tend to be stocky in appearance, and have 3 pairs of legs located towards the front half of their body. Damselflies larvae are more delicate in appearance and have a narrower abdomen. The easiest way to differentiate between dragonfly and damselfly nymphs is to look closely at the end point of the abdomen. Damselflies have 3 feathery gills protruding out whereas dragonflies have 5 very short spine-like projections.



While both come in many sizes and colors, dragonflies (above) rest with their wings outstretched and damselflies rest with their wings folded back.



As the nymphs grow larger, they basically outgrow their outside covering called an exoskeleton. The exoskeleton is shed and replaced by a larger one. When the nymph reaches adulthood, the exoskeleton is shed one last time. It climbs out of the water and attaches itself to a small branch, piece of wood, a rock or any other suitable structure. Immediately after wiggling free of the exoskeleton, the dragonfly pumps fluid to its new wings which are iridescent and soft. Within a few days the wings lose their shine and

the dragonfly begins to develop its adult color.

What dragonflies eat.

Dragonflies are voracious predators both in the larval stage and as adults. They have mouthparts especially designed to catch and hold prey. In the larval stages they eat other small insects, worms, tadpoles, salamander larvae, and even small fish. As adults, they are excellent hunters. Dragonflies are sometimes called sewing needles or darners – there is even the myth that they could sew up portions of human skin if they landed on you. Dragonflies, in fact, may slightly pinch your hand, but they only hunt small, soft bodied insects. Dragonflies are actually very beneficial and can eat many insect pests; flies and mosquitoes need to be concerned, but not people!

How to identify dragonfly and damselfly types.

There are some excellent books on dragonflies, including [A Field Guide to the Dragonflies & Damselflies in Massachusetts](#) published by the Department of Fisheries and Wildlife's Natural Heritage & Endangered Species Program (go to www.mass.gov/dfwele/dfw/nhesp/nhpubs.htm for more information). Many common species may be observed using a good pair of binoculars. Try looking in different areas such as along streams, near ponds, or in the woods. Vary the time of observation to find a larger variety of species. If you are really serious about dragonflies (they can become somewhat addictive), get a large insect net. Try to scoop the dragonfly or damselfly from the back then quickly flip the net so that the insect is trapped inside. Dragonflies are quick and often hard to catch but, with a little practice, it can be done. With the dragonfly in hand and using a field guide, try to match up the body shape and colors. For more hints on catching and identifying odonates, see the reading list at the end of this article.

Threats to dragonfly and damselfly populations.

Because dragonflies and damselflies begin their lives in water and must reproduce in water, habitat degradation and loss are

CONTINUED ON PAGE 7

Where The Dragonfly Roam...

The photographs on this page have been taken by Dave Small, a member of the DCR Quabbin staff and an avid dragonfly enthusiast.

This page shows typical dragonfly and damselfly habitats. The top of the page depicts a vernal pool, the middle area, a stream and at the bottom of the page a pond environment is shown.



The Slaty Skimmer is a common deep blue dragonfly. The males are very territorial and will clash often. These hunt along forest edges.

The Painted Skimmer favors in vernal pools and grassy ponds. Noted for its golden color they hunt in open fields and may travel great distances from water.



The Maine Snaketail, noted for the intricate pattern on its tail, is uncommon and prefers clear rocky streams.



The American Rubyspot, an uncommon damselfly, prefers moderately flowing streams.

The Widow Skimmer is common, and named for its black wing markings.



The Eastern Pondhawk is a beautiful powder blue color. It prefers open lakes, vegetated ponds and slow streams. It is a particularly good hunter.



The American Emerald, noted for its striking green eyes, is particularly common to interior Mass. They hunt along forest edges.

Recreation Options In The DCR Watershed Area

Public access on or around Quabbin and Wachusett Reservoirs, due to their unique nature as a source of drinking water for over 2 million Massachusetts citizens, is carefully regulated and controlled. Human activity on or near source waters serve as potential routes for the introduction of disease causing agents, so recreational opportunities are limited, primarily to hiking, wildlife watching, and fishing (in season). Many popular activities, such as swimming and dog walking, are prohibited. The exact rules are different for each watershed; details of the DCR/DWSP public access policies are available on-line at www.mass.gov/dcr/waterSupply/watershed/pacc.htm.

There are, however, many other natural areas close to both reservoirs that offer diverse opportunities to enjoy the outdoors. The Office of Watershed Management is part of the Department of Conservation and Recreation, which also operates State Parks throughout the region. The MA Department of Fish and Wildlife maintains property across central Massachusetts that allow hunting, fishing, dog walking and other outdoor pursuits. Non-Profit environmental organizations, such as The Trustees of the Reservation, Mass Audubon, and the Mt. Grace Land Trust, are private stewards of open space that allow the public on their property. Many communities also have town land set aside as conservation, swimming, or other recreation areas.

These website addresses provide detailed descriptions for recreation opportunities in the area surrounding the Quabbin and Wachusett Reservoir:

- DCR Division of State Parks and Recreation: www.mass.gov/dcr/forparks.htm
- Mass Wildlife: www.mass.gov/dfwele/dfw/dfwrec.htm
- MA Office of Fishing and Boating Access: www.mass.gov/dfwele/pab/index.htm
- Trustees of the Reservation: www.thetrustees.org
- Mass Audubon Society: www.massaudubon.org
- Mt. Grace Land Trust: www.mountgrace.org

The following are some favorite places in the region that allow the activities that DWSP does not permit on its watershed property. Unless noted otherwise, the facilities are managed by DCR Division of State Parks and Recreation, and more detailed information can be obtained at www.mass.gov/dcr/forparks.htm.

Dog Walking

- Leominster State Forest (Leominster; 978-874-2303)
- Mt. Holyoke Range State Forest (Amherst; 413 586-0350)
- Wachusett Mountain State Reservation (Princeton; 978-464-2987)
- Wendell State Forest (Wendell; 413-659-3797)

Bicycle Paths

- Norwottuck Rail-Trail (Northampton/Amherst/Hadley; 413 586-8706 ext. 12)

- Wachusett Greenway portion of the Mass Central Rail Trail (Sterling, West Boylston, Holden, Rutland; www.wachusettgreenways.org)

Swimming

- Lake Arcadia (Belchertown Town Beach; www.belchertown.org/departments/rec/town_beach.htm)
- Lake Wyola State Park (Shutesbury; 413-367-0317)
- Philip Weihn Memorial Swimming Pool (Clinton; 978-365-4684)
- Quinsigamond State Park (Worcester; 508-755-6880)
- Rutland State Park (Rutland; 508-886-6333)

Canoeing and Boating

- Connecticut River Greenway State Park (car top boat access in several locations, including Sunderland, Hatfield, and Northampton; 413-586-8706 x12)
- Lake Dennison Recreation Area (Winchendon; 978-939-8962)
- Streeter Point Recreation Area (Sturbridge; 508-347-9316)

Camping

- Barton Cove Campground at Northfield Mountain (Northfield; www.nu.com/northfield or 413-863-9300)
- Erving State Park (Erving; 978-544-3939)
- Lake Dennison Recreation Area (Winchendon; 978-939-8962)
- Otter River State Park (Baldwinville; 978-939-8962)
- Pearl Hill State Park (West Townsend; 978-597-8802)
- Tully Lake Campground (Royalston; www.thetrustees.org or 978-249-4957)
- Wells State Park (Sturbridge; 508-347-9257)

Information on reserving a State Park campgrounds can be found at www.mass.gov/dcr/recreate/camping.htm; call either 1-877-422-6762 (U.S. and Canada), 518-884-4959 (Outside U.S. and Canada), or 1-877-620-0833 (TTY).

Maria Beiter - DCR Quabbin Visitors Center



Family fun and adventure can be found close to home on lands managed by any one of several state agencies and local organizations

Photo, DCR/DWSP

SMALL WONDERS - FROM PAGE 4

affecting some dragonfly species. Filling or polluting wetlands, fragmentation of habitats, removal or alteration of surrounding vegetation around wetlands, and the introduction of invasive species all take their toll on aquatic species. Altering the habitat used by the adults also has detrimental effects. Clearing of forests, increased building pressures, insecticides, road mortality (checking the grill on your car may be an easier way to get samples than with a net!), and even boat traffic all destroy some dragonflies. Massachusetts has approximately 166 species of odonates and 32 of those are at population levels which have caused reason for concern. If you are interested in finding out more, go to the Natural Heritage & Endangered Species Web site.

Paula Packard - DCR Aquatic Biologist

Further Reading

A Field Guide to the Damselflies and Dragonflies of Massachusetts. (2003) B. Nikula, J. Loose and M. Burne. Massachusetts Division of Fisheries & Wildlife. Natural Heritage & Endangered Species Program.

Stokes Beginner's Guide to Dragonflies and Damselflies. B. Nikula and J. Stone. (2002) Little, Brown and Co.

Dragonflies Through Binoculars. S. Dunkle. (2000) Oxford University Press.

An Introduction to the Study of Insects. D. Borror, C. Triplehorn, and N. Johnson. (1989). Harcourt Brace College Publishers.

...or on the internet...

Odonate Info Network
www.odonews.org/

A Beginner's Guide to Dragonflies
http://powell.colgate.edu/wda/Beginners_Guide.htm

Kids' Corner

Probing the Pond

Ponds are full of animals that we see regularly, like frogs, turtles, fish and ducks. Many people are not aware of the interesting creatures living in a pond that support the visible animals. You can find a variety of strange animals, including the larvae of many insects, by carefully exploring a pond with a net.

Materials you will need: A dip net with small mesh or a large kitchen strainer for collecting animals; a white dish pan for observing; a white plastic spoon; a magnifying glass; and a "pond life" book (a good example is *Pond Life*, by George K. Reid & Herbert S. Zim Golden Press, New York, NY, (1967) or visit your local library for more choices).

Procedure: Find a pond with a gently sloping shore that has some vegetation close by. Look along the shoreline for pond animals, such as frogs, turtles, snakes or insects. Also look for the tracks of land animals that may have visited the pond before you.

Look on the surface of the water and into the pond to see if you can find creatures moving around.

Next, carefully sweep the net through the water close to the plants or along the bottom of the pond. Holding the net over the water, let it drain back into the pond, as there are many microscopic plants and animals that will slip through the net or strainer.

Look closely at the contents of the net to see if any creatures are moving. Gently remove them from the net using the "creature extractor" (the white plastic spoon) and place them in the dish pan that has been filled with pond water. Try not to get many plants, mud or leaves in the pan because it makes the animals hard to observe. Use the "pond life" reference book to figure out what it is you found.

After examining your "catch," carefully place the material back into the pond.

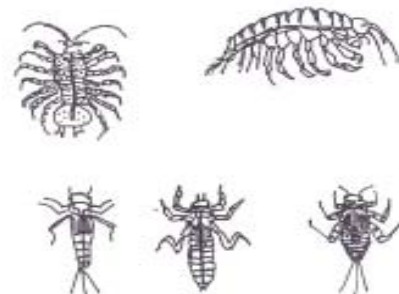
Try a few different places along the shoreline to see if you can discover a variety of animals. Be careful not to handle frogs, tadpoles and salamanders too much, as they have very sensitive skin.

Release Ceremony: The animals should be released back in the pond where they were collected, as it is their home. Gently tip the basin so the water and creatures slip into the water. You can also say this poem:

Swim away, float away, dive away, leap
You're free to go, I'm not going to keep
You from living your life.
You deserve to swim free.
Thanks for sharing this time with me.

Jim Lafley - DCR Education Coordinator

Some of the creatures you will find on your Pond Probe are shown below, listed clockwise from top left: Sow bug, Scud, Mayfly larva, Dragonfly larva, Damselfly larva



Illustration, J Taylor

Quabbin Reservoir Water Flows For 60 Years



Far Left: The Quabbin Reservoir fills to nearly full capacity and the spillway releases water for the first time in 1946.

Near Left: The Quabbin spillway today, releasing water back to the Swift River 60 years later.

Technically the reservoir was not full on that day, having reached only elevation 528.66' Boston City Base (the top of the spillway wall - which represents full capacity - is 530' BCB). Nevertheless, it was an opportunity to celebrate the completion of a 20 year process of reservoir planning, design and construction.

Quabbin Reservoir did not reach true capacity until April 1947, when water first flowed over the top of the spillway wall. Since that time the reservoir has released water over the top of the spillway wall 24 times, most recently winter of 2006. It was only the second time the reservoir was at 100% capacity on January 1st, spilling 385 million gallons per day at its peak.

June 22, 2006 marks the 60th anniversary of the first release of water from Quabbin Reservoir. In a ceremony on that day, water was discharged down the spillway channel back into the original bed of the

Swift River. Dignitaries at this event included Mrs. Frank Winsor, widow of the Chief Engineer on the Quabbin Project who died suddenly in 1939 before Quabbin Reservoir construction began,

DOWNSTREAM

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Downstream is produced twice a year by the Massachusetts Department of Conservation and Recreation, Division of Water Supply Protection. It includes articles of interest to residents of the watershed system communities. Our goal is to inform the public about watershed protection issues and activities, provide a conduit for public input, and promote environmentally responsible land management practices.

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